

I claim:

1. A marine propulsion system, comprising:

a water passage having an inlet opening disposable in fluid communication  
5 with a body of water in which said marine propulsion system is operated and an outlet opening from which water can be expelled to provide a propulsive force for a marine vessel;

an impeller connectable in torque transmitting association with an output shaft of an engine, said impeller being disposed within said water passage between  
10 said inlet opening and said outlet opening; and

a water pump having an inlet conduit and an outlet conduit, said inlet conduit being disposable in fluid communication with said body of water in which said marine propulsion system is operated, said outlet conduit being connectable in fluid communication with a cooling system of said engine.

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2. The system of claim 1, wherein:

said engine is attached in torque transmitting relation with said impeller.

3. The system of claim 1, wherein:

20 said engine comprises a crankshaft supported for rotation about a vertical axis.

4. The system of claim 1, wherein:

25 said impeller is attached to an impeller shaft for rotation with said impeller shaft which is supported for rotation about a horizontal axis.

5. The system of claim 1, wherein:

said water pump is disposed at a location which is below a surface of said body of water when said marine vessel is at rest.

6. The system of claim 1, wherein:

5       said water pump is disposed outside of said water passage.

7. The system of claim 2, wherein:

      said water pump is driven by said crankshaft, said output shaft being said crankshaft.

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8. The system of claim 1, wherein:

      a rotor of said water pump is generally concentric with a driveshaft of said marine propulsion system.

15 9. The system of claim 8, wherein:

      said driveshaft is connectable in torque transmitting relation with said crankshaft of said engine.

10. The system of claim 1, wherein:

20       said water pump is a positive displacement pump.

11. The system of claim 1, wherein:

      said water pump is an electric pump.

25 12. The system of claim 1; further comprising:

      a clutch connectable in torque transmitting association between said impeller and said output shaft of said engine, said clutch being configured to disconnect

said impeller from torque transmitting relation with said output shaft of said engine.

13. The system of claim 12, wherein:

5       said water pump is disposed between said engine and said clutch.

14. The system of claim 1, wherein:

      said water pump is operable to pump water from said body of water to said cooling system of said engine independently of said impeller.

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15. The system of claim 1, wherein:

      said inlet conduit of said water pump is disposed in fluid communication with said water passage.

15     16. A marine propulsion system, comprising:

      a water passage having an inlet opening disposable in fluid communication with a body of water in which said marine propulsion system is operated and an outlet opening from which water can be expelled to provide a propulsive force for a marine vessel;

20       an impeller connectable in torque transmitting association with an output shaft of an engine, said impeller being disposed within said water passage between said inlet opening and said outlet opening, said impeller being attached to an impeller shaft for rotation with said impeller shaft which is supported for rotation about a horizontal axis; and

25       a water pump having an inlet conduit and an outlet conduit, said inlet conduit being disposable in fluid communication with said body of water in which said marine propulsion system is operated, said outlet conduit being connectable in

fluid communication with a cooling system of said engine, said water pump being displaced from said water passage.

17. The system of claim 16, wherein:

5        said water pump is disposed at a location which is below a surface of said body of water when said marine vessel is at rest.

18. The system of claim 16, wherein:

10      said water pump is driven by said crankshaft, said output shaft being said crankshaft.

19. The system of claim 16, wherein:

15      a rotor of said water pump is generally concentric with a driveshaft of said marine propulsion system.

20. The system of claim 19, wherein:

      said driveshaft is connectable in torque transmitting relation with said crankshaft of said engine.

20    21. The system of claim 20, wherein:

      said water pump is a positive displacement pump.

22. The system of claim 19, wherein:

      said water pump is an electric pump.

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23. The system of claim 16, further comprising:

a clutch connectable in torque transmitting association between said impeller and said output shaft of said engine, said clutch being configured to disconnect said impeller from torque transmitting relation with said output shaft of said engine.

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24. The system of claim 23, wherein:

said water pump is disposed between said engine and said clutch.

25. The system of claim 16, wherein:

10       said water pump is operable to pump water from said body of water to said cooling system of said engine independently of said impeller.

26. The system of claim 16, wherein:

15       said inlet conduit of said water pump is disposed in fluid communication with said water passage.

27. The system of claim 16, wherein:

said engine is attached in torque transmitting relation with said impeller.

20       28. The system of claim 27, wherein:

      said engine comprises a crankshaft supported for rotation about a vertical axis.

29. The system of claim 16, wherein:

25       said marine vessel is a personal watercraft.

30. A marine propulsion system, comprising:

an engine;

a water passage having an inlet opening disposable in fluid communication with a body of water in which said marine propulsion system is operated and an outlet opening from which water can be expelled to provide a propulsive force for  
5 a marine vessel;

an impeller connectable in torque transmitting association with an output shaft of an engine, said impeller being disposed within said water passage between said inlet opening and said outlet opening, said impeller being attached to an impeller shaft for rotation with said impeller shaft which is supported for rotation  
10 about a horizontal axis; and

a water pump having an inlet conduit and an outlet conduit, said inlet conduit being disposable in fluid communication with said body of water in which said marine propulsion system is operated, said outlet conduit being connectable in fluid communication with a cooling system of said engine, said water pump being  
15 a positive displacement pump.

31. The system of claim 30, wherein:

said water pump is disposed at a location which is below a surface of said body of water when said marine vessel is at rest.

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32. The system of claim 31, wherein:

said engine comprises a crankshaft supported for rotation about a vertical axis.

25 33. The system of claim 32, wherein:

said water pump is driven by said crankshaft, said output shaft being said crankshaft, a rotor of said water pump being generally concentric with a driveshaft of said marine propulsion system.

5    34. The system of claim 33, wherein:

      said driveshaft is connectable in torque transmitting relation with said crankshaft of said engine.

35. The system of claim 30, wherein:

10      said water pump is an electric pump.

36. The system of claim 30, further comprising:

      a clutch connectable in torque transmitting association between said impeller and said output shaft of said engine, said clutch being configured to disconnect  
15      said impeller from torque transmitting relation with said output shaft of said engine.

37. The system of claim 30, wherein:

      said water pump is operable to pump water from said body of water to said  
20      cooling system of said engine independently of said impeller.

38. The system of claim 30, wherein:

      said inlet conduit of said water pump is disposed in fluid communication with said water passage.

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39. The system of claim 30, wherein:

      said marine vessel is a personal watercraft.